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Professional Insurance

A LETTER in our correspondence columns this week draws attention to the work of the National Veterinary Benevolent and Mutual Defence Society, and our correspondent cites a typical example of the kind of help the Society provides to members of the profession. At a time when the value of livestock of all kinds has increased so much, and at a time also when new therapeutic agents are constantly being tried, protection against the possibility of legal action by a client assumes particular importance.

A medical journal recently commented upon the number of actions brought by patients against the medical staffs in nationalised hospitals, and there is no doubt—particularly in view of various legal aid schemes and the heavy damages awarded in courts of law—that people generally are much more litigious than they used to be. The excessive taxation levied upon professional men in these days, and the high cost of legal advice make it impossible to regard with equanimity even a remote risk of becoming involved in an action which may well cost several hundred pounds, quite apart from any damages that might be awarded.

It is against this background that the work of the National Veterinary Benevolent and Mutual Defence Society must be regarded, and we have learnt with some surprise that quite a considerable proportion of veterinarians in private practice—that is to say those most vulnerable to legal process in the above sense—are not subscribing members of this organisation. In commending it to our readers in this fashion, we do so not only because the subscription is small and the possible benefits very great, but because the Officers of the Society, who give a good deal of their time and sometimes travel long distances to attend meetings, perform their tasks for no material reward.

So far as we know they are the only active directors of an insurance company who receive neither emoluments nor fees. They are working for the benefit of their professional colleagues, and we feel that even apart from benefits available they should receive the fullest encouragement and support.

To the young practitioner, especially, the facilities offered should commend themselves. None of us is infallible and genuine errors of diagnosis can be made. The cost of error could conceivably be such that a young veterinarian might be ruined. But to all practitioners, even those of mature experience, professional insurance would seem to be an indispensable safeguard, and certainly there could be none less expensive for the degree of its effectiveness than that available to members of the R.C.V.S.

The Effect of Feeding a Diet containing Stilboestrol and Thyroxine to Growing Pigs with Special Reference to the Toxicity of Stilboestrol

BY

J. H. TAYLOR and W. S. GORDON

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FOR some time hormonal substances have been studied with a view to accelerating the growth rate of animals, and it has been claimed that stilboestrol (Braude, 1947a) and possibly iodinated casein (Braude, 1947b) may increase the growth rate of young pigs. Similar results have been claimed for a combination of stilboestrol and iodinated casein (Braude, 1948 and 1950) and recently it has been suggested by Barber, Braude & Mitchell (1953) that the use of a combination of stilboestrol and thyroxine will further enhance the normal response brought about by feeding an antibiotic supplement.

The purpose of the investigation described in this paper was to determine whether the enhanced growth response and improved food conversion normally brought about by an antibiotic supplement could be further increased by the addition of a combination of stilboestrol and thyroxine to the diet. The opportunity was also taken to determine whether these hormonal substances had any adverse effect on the health of the pigs when fed over a long period, and to examine the carcases for the presence of residual stilboestrol.

The section of this work comparing growth rates and food conversion ratios of the various groups constitutes part of a co-ordinated trial carried out at various centres, and sponsored by the Agricultural Research Council. The results at the other centres will be reported at a later date.

Materials and Methods

Thirty-six castrated male pigs with a mean weight of 49.3 lb. were selected from the herd of pedigree Large White pigs at this Field Station and were housed in a Danish-type house in which conditions of environment and management were standardised. Pigs were fed to appetite twice daily and were slaughtered at approximately 210 lb. live-weight.

The plan of the experiment is shown in Table I, from which it can be seen that a control group was compared with groups receiving thyroxine and stilboestrol, aureomycin, penicillin and a combination of thyroxine and stilboestrol with each antibiotic.

Basic Rations

The basal diet was made up in the following parts by weight.

Up to 20 weeks of age		*Over 20 weeks of age*	
Barley Meal ...	40	Barley Meal ...	55
Wheat Meal ...	40	Wheat Meal ...	20
Flaked Maize ...	10	Flaked Maize ...	10
Fish Meal ...	7½	Oatmeal	10
Grass Meal ...	2½	Grass Meal ...	5

Minerals 44 pounds per ton.

The mineral mixture consisted of three parts ground chalk, one part steamed boneflour and one part salt.

Antibiotic and Hormonal Supplements

Stilboestrol was fed as stilboestrol B.P. at the rate of 13.4 grammes per ton of food (6 mg. per lb.) and thyroxine at 0.672 gramme per ton of food (0.3 mg. per lb.). The antibiotics were aureomycin and penicillin, fed respectively as "Aurofac 2A," at a rate equivalent to 18 grammes of aureomycin hydrochloride per ton of food, and procaine penicillin fed at the rate of 18 grammes per ton of food. The supplements were pre-mixed with ground oyster shell meal where necessary, to provide 5 lb. of each supplement per ton of food. The rations were mixed and the supplements incorporated as described by Gordon & Taylor (1953). The efficiency of mixing the anti-

TABLE I

PLAN OF EXPERIMENT

Pen	Number of pigs in each pen	Mean weight at commencement of experiment (lb.)	Supplements			
			Antibiotics (18 grammes per ton)	Hormones	Quantity	
					Grammes per ton	Mg. per lb.
I	6	50·2	—	—	—	—
II	6	49·2	—	Thyroxine	0·67	0·3
				Stilboestrol	13·4	6·0
III	6	47·8	Aureomycin	—	—	—
IV	6	49·7	Penicillin	—	—	—
V	6	52·2	Aureomycin	Thyroxine	0·67	0·3
				Stilboestrol	13·4	6·0
VI	6	46·8	Penicillin	Thyroxine	0·67	0·3
				Stilboestrol	13·4	6·0

TABLE II

COMPARISON OF GROWTH RATE, FOOD CONVERSION RATIO AND TOXICITY IN TREATED AND CONTROL PIGS

Pen	Supplement	Growth rate (lb.)	Growth rate increase (expressed as per cent. of control)	Conversion ratio	Food saved (expressed as per cent. of control)	Number showing symptoms of toxicity	
						Died	Recovered
I	None	1·56	—	3·06	—	—	—
II	Stilboestrol Thyroxine	1·55	−0·6	3·09	−1·0	2	—
III	Aureomycin	1·68	7·7	2·85	7·1	—	—
IV	Penicillin	1·63	4·5	2·97	2·9	—	—
V	Stilboestrol Thyroxine Aureomycin	1·56	0	3·11	−1·6	1	1
VI	Stilboestrol Thyroxine Penicillin	1·61	3·2	3·01	1·6	—	1

biotic supplements was checked by assay of the supplemented foods.

Records

Individual pig weights and pen food consumptions were ascertained weekly. The following information was recorded:—

1. Growth rate. The average daily live-weight gain in pounds.
2. Conversion ratio. $\frac{\text{Weight of food consumed.}}{\text{Live-weight gain.}}$
3. Toxicity. Details of toxicity due to any of the supplements being fed.

diet appeared to reduce the benefit obtained with the antibiotic alone.

3. Toxicity

By the second week of the experiment a total of five animals, representing each group receiving stilboestrol and thyroxine, showed symptoms suggestive of stilboestrol toxicity. Three of these animals subsequently died and were examined *post-mortem*. None of the control animals showed similar symptoms (Table II).

Symptoms first appeared within 3 to 13 days of the commencement of experimental feeding and lasted from 2 to 16 days, as shown in Table III.

TABLE III

INCIDENCE, DURATION AND COURSE OF STILBOESTROL TOXICITY IN THE PIG

Supplement	Dose* (mg. per lb. food)	Number of pigs involved	Number of pigs affected	Commencement of experiment		Period before commencement of symptoms (days)	Duration of symptoms (days)	Result
				Age (days)	Weight (lb.)			
Stilboestrol and Thyroxine (Pens II, V and VI)	6	18	5	96	32	3	2	Death
				97	54	7	2	"
	0·3			97	52	7	4	"
				97	48	11	7	Recovery
				105	34	13	10	"
No hormones (Pens I, III and IV)	—	18	0	100 (average)	36 (average)	—	—	—
Stilboestrol (Group A)	20	3	1	56	24	18	4	Death
None (Group B)	—	3	0	55 (average)	23 (average)	—	—	—

4. Residual stilboestrol. The presence of stilboestrol in the carcase and urine of stilboestrol-fed pigs was investigated using a test based on the observations of Astwood (1939) depending upon an increase of uterine weight in the rat.

RESULTS

1 & 2. Growth Rate and Food Conversion

It can be seen from Table II that an increase in growth rate and a saving in food consumption occurred when either antibiotic was fed, but not when the diet was supplemented with a combination of stilboestrol and thyroxine. The addition of stilboestrol and thyroxine to an antibiotic supplemented

Affected pigs were about 14 to 15 weeks of age and weighed 32 to 54 lb. live-weight. The two affected animals which recovered subsequently showed a reduction in growth rate of 10 per cent. and 66 per cent. respectively when compared with the average growth rate of their pen mates when at 100 lb. live-weight.

In order to confirm the tentative diagnosis of stilboestrol poisoning, stilboestrol without thyroxine was fed to three eight-week-old castrated male pigs at the arbitrarily chosen rate of 20 mg. per pound of food (Group B). For each of these pigs a castrated male litter-mate of similar weight was put into a control group (group A). The supplement was

fed for one month during which time one pig receiving stilboestrol died. At the same time its control litter-mate was bled out from the vena cava and a comparison of the two carcases was made at *post-mortem*. These comparisons are shown in Figures 1 to 4 and 6 to 9. The clinical and *post-mortem* findings in all affected pigs were similar, and will be described together.

(a) *Clinical Symptoms*

The onset of symptoms was sudden, commencing with anorexia and persistent abdominal straining. The temperature, which was taken each morning, remained normal but respirations were laboured.

The terminal portion of the rectum became everted and subsequently necrotic. Peri-anal tissues became swollen and in two cases suppurative. The affected animals showed stiffness of gait and incoordination of the hind quarters. The hind limbs were abducted and pain was shown on palpation of the hypogastric region. Incontinence was followed after a few days by anuria. These symptoms were followed by collapse and death.

The less acute cases, which subsequently recovered, showed only anorexia, abdominal straining and eversion of the terminal portion of the rectum, which eventually returned to its normal position.

(b) *Post-Mortem Findings.*

Carcases. Most carcases were in poor bodily condition and showed cyanosis of skin and mucosae (fig. 1, B).

Body cavities. In one case the thoracic cavity contained a small quantity of blood-stained exudate. In two cases the abdominal cavity contained from 1 to 1½ pints of a clear straw-coloured fluid and the retroperitoneal connective tissue was oedematous.

Cardio-vascular system. The more acute cases showed epicardial haemorrhages and congestion of mesenteric vessels. All cases showed cardiac hypertrophy with an increase in weight of the heart of up to 64 per cent. over a similar control animal (Table IV).

TABLE IV

COMPARISON OF CONTROL AND STILBOESTROL-FED PIGS (20 MG. PER LB. FOOD FED) CASTRATED MALE LITTER-MATES

	Control pig	Stilboestrol-fed pig
Weight at commencement of experiment	23 lb.	24 lb.
Weight at death	62 „	49 „
„ of left kidney ...	37 grammes	46 grammes
„ „ heart	99 „	165 „
„ „ body of prostate gland	1 gramme	3·5 „
Weight of seminal vesicles ...	2 grammes	14 „

Digestive system. The rectum was grossly abnormal and appeared as a gelatinous mass containing shreds of necrotic tissue (fig. 4). In one case a large area of peri-anal tissue was necrotic at the time of death, and in another deep suppurative lesions were found in the associated muscular tissue.

Urino-genital system. The kidneys were enlarged and increased in weight up to 24 per cent. (Table IV) and on section appeared congested, with petechial haemorrhages in the renal cortex (fig. 7). The ureters were thickened, and the bladder showed gross distension and acute inflammation (fig. 2). The pelvic urethra was enlarged and showed petechial haemorrhages and thickening of the mucosa. The prostate gland and seminal vesicles were grossly enlarged. Even in animals showing no clinical symptoms, a gross thickening of the urethra and enlargement of the prostate gland and seminal vesicles was invariably seen at slaughter (fig. 5).

Thyroid glands. These were smaller and on an average 30 per cent. lighter in the stilboestrol and thyroxine fed group when compared with their controls.

Histological examination. Tissue from a control pig and a stilboestrol-fed pig was taken from the prostatic urethra.

Control pig (Fig. 8). Three layers of tissue surrounded the urethra (a) an outer layer of striated muscle, (b) a middle layer of strands of striated muscle merging into a fibroblast-collagen matrix in which lay the prostatic acini and ductules, (c) an inner layer of fibroblast-collagen groundwork supporting a few acini and ductules. Acini and ductules were lined by cuboidal, sometimes more columnar, epithelium; small amounts of secretion were noted, and occasional concretions. Cells in the matrix were mostly fibroblasts and histiocytes, and bands of smooth muscle cells, with occasional small round cells. The urethra was lined with transitional epithelium. Blood vessels were numerous throughout the tissue.

Stilboestrol-fed pig (Fig. 9). The outermost layer of striated muscle showed thinning and merged indistinctly with the middle layer of a markedly developed collagen which had a very cellular appearance, the cells being fibroblasts, neutrophils, and small round cells. Prominent bands of smooth muscle fibres surrounded acini and ductules. Numerous foci of small round cells were noted. The acini and ductules were greatly dilated and lined by hyperplastic epithelium consisting of a basal layer of columnar cells covered with layers of cells becoming progressively flatter; in places this epithelium was 12-cells deep; slight shedding of superficial epithelial cells was noted. Infiltration of small round cells into the basal epithelial layer was noted in places, and neutrophils were scattered throughout the layers of epithelium. The lumena of acini and ductules frequently contained masses of degenerating neutrophils and epithelial cells. Degenerating cells were found in the urethral epithelial lining and infiltration of neutrophils and small round cells into the sub-epithelial region was noted; there was an abnormal degree of folding of the urethral lining and epithelial debris and degenerating neutrophils were present in the lumen. Blood vessels were very prominent in all areas.

In general, there was a marked difference between sections from the two animals, and tissue from the stilboestrol-fed pig showed evidence of grossly abnormal cellular activity similar to that described by Burrows (1935), following the administration of oestrogens to male mice.

TAYLOR, J. H., & GORDON, W. S.—THE EFFECT OF FEEDING A DIET CONTAINING STILBOESTROL AND THYROXINE TO GROWING PIGS WITH SPECIAL REFERENCE TO THE TOXICITY OF STILBOESTROL

EXPLANATION OF PLATES

Figures 1 to 4 and 6 to 9 compare material from castrated male litter-mates of equal weight at the commencement of the trial. Pig "A" is the control to pig "B" which received 20 mg. stilboestrol per lb. of food.

FIG. 1.—The carcase of a pig which died while receiving stilboestrol, with its control litter-mate slaughtered at the same time.

FIG. 2.—Gross enlargement of bladder and pelvic urethra.

FIG. 3.—The rectum of a control pig.

FIG. 4.—The rectum of a stilboestrol fed pig showing extensive necrosis.

FIG. 5.—The bladder, prostate, seminal vesicles and urethra of a control pig (left) and a stilboestrol-and-thyroxine-fed pig (6 mg. stilboestrol per lb. of food) which showed no symptoms of toxicity.

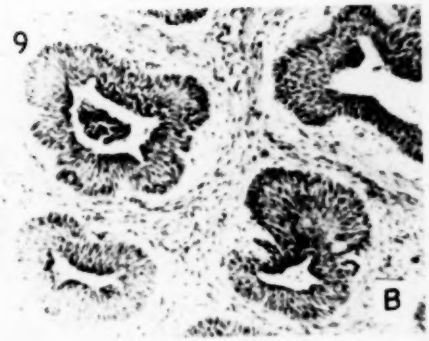

FIG. 6.—Cardiac hypertrophy in a stilboestrol-fed pig (Table IV).

FIG. 7.—Renal hypertrophy in a stilboestrol-fed pig (Table IV).

FIG. 8.—Urethral prostate of control pig. H. & E. × approx. 120.

FIG. 9.—Urethral prostate of stilboestrol-fed pig. H. & E. × approx. 120.

4. Detection of Stilboestrol in the Carcase and the Urine

The results of these tests are shown in Table V.

(a) *Carcase.* Two groups of 20 immature female rats were each fed solely on a mixture of approximately equal parts of muscle and fat from the experimental pigs, which were slaughtered three hours after feeding. One group of rats was fed on meat from a pig fed 6 mg. of stilboestrol per pound of food and the other on meat from a control pig. The rats were killed after four days. The mean uterine weight of the group receiving meat from the stilboestrol-fed pig was found to be 81 per cent. greater than the control.

(b) *Urine.* The urine of a stilboestrol-fed pig slaughtered one hour after feeding was sterilised by filtration and 1 ml. was injected intraperitioneally into each of five immature female rats. Five control rats each received 1 ml. intraperitioneally of similarly treated urine from control pigs. The rats were killed after 18 hours, and the mean uterine weight of the group receiving urine from a stilboestrol-fed pig was 85 per cent. greater than that of the control group.

This test was repeated using the pooled urine of three stilboestrol-fed pigs killed at three hours after feeding. The mean uterine weight of the group receiving urine from the stilboestrol-fed pigs was 105 per cent. greater than the control group.

A standard solution of 5 μg. per ml. of stilboestrol in normal urine produced a mean increase in uterine weight of 56 per cent. and the potency of this solution and of the urine of a stilboestrol-fed pig was not reduced by boiling the inoculum for twenty minutes.

TABLE V

THE RESULTS OF A TEST FOR OESTROGENS DEPENDING UPON AN INCREASE IN UTERINE WEIGHT OF IMMATURE RATS

	Meat of experimental pigs fed by mouth		Urine of experimental pigs one hour after feeding. 1 ml. by intraperitoneal injection			Urine of experimental pigs three hours after feeding. 1 ml. by intraperitoneal injection		Standard solution of stilboestrol in normal urine 5 μg. per ml.	
	Control pig	Stilboestrol-fed pig	Control pig	Stilboestrol-fed pig	Test urine heated 100° C. for 20 minutes	Control pig	Stilboestrol-fed pig	Heated 100° C. for 20 minutes	Not heated
Number of rats ...	20	20	5	5	5	5	5	5	5
Mean weight of rats (grammes)... ...	60	59	48	49	49	58	59	48	45
Mean weight of uteri (mg.)	57	103	42·5	78·8	75·3	50·4	103	68	66·4
Per cent. increase in weight over controls	—	81	—	85	77	—	105	60*	56*

* Compared with control material in column 3.

Discussion

Under the conditions described we were unable to show any benefit from feeding a combination of stilboestrol and thyroxine either with or without an antibiotic supplement.

Symptoms suggestive of stilboestrol toxicity occurred in five of the pigs receiving stilboestrol and thyroxine, and these symptoms have been reproduced by feeding a higher dose rate of stilboestrol alone. At the onset of symptoms the pigs were each consuming an average of 15 mg. of stilboestrol per day, or approximately 0.75 mg. per kilo bodyweight.

These findings were not in accordance with those of Braude (1950) and Barber *et al.* (1953). It has, however, been shown by Sleeth, Pearson, Wallace, Kropf & Koger (1953) that the prolonged injection of oestradiol failed to increase significantly the growth rate of young pigs.

Since the original synthesis of diethylstilboestrol in 1938 by Dodds, Goldberg, Lawson & Robinson, many reports have appeared concerning its toxicity in man and animals. In the human subject the incidence of toxic symptoms is variable, but Shorr, Robinson & Papanicolaou (1939) reported that of 44 cases of stilboestrol therapy 35 (80 per cent.) showed some toxic symptoms. Von Haam, Hammel, Rardin & Schoene (1940) studied 125 cases of which 42 per cent. showed toxic symptoms. In all except nine of the cases therapy could be continued by reducing the dose rate. Shorr *et al.* (1939) on the other hand suggested that there is no relationship between the size of dose and the development of toxic symptoms. They considered the toxic effects to be mainly "central in origin" whether administration is by mouth or by injection, and that there is no evidence that the host may acquire a tolerance to the drug. In the human subject there is a wide range of toxic symptoms including marked lassitude bordering on hypnosis, vomiting, diarrhoea, acute thirst and cutaneous eruptions. Gastro-intestinal disturbances are considered to predominate in this syndrome.

Similar findings do not appear to have been reported in the domesticated animals, and a direct comparison with the human subject may be misleading due to inherent and circumstantial differences. Folley & Malpress (1943b) administered synthetic oestrogens orally to lactating dairy cattle and reported prolapse of the vagina and rectum which persisted after cessation of treatment. The same authors (1943a) also reported that "The nymphomaniac syndrome, which to a varying degree was exhibited by most animals under experiment, and which in a disturbingly high proportion of cases culminated in fracture of the pelvis necessitating the slaughter of the affected animals, constitutes a

serious and undesirable side effect of prolonged oestrogen treatment." This syndrome included relaxation of the pelvic ligaments and elevation of the tail-head which tended to produce difficulty in calving.

Jordan (1953) studied the effect of giving an implant of 12 mg. of stilboestrol to young lambs, and of a group of 9,000, 2,000 died showing symptoms of inflammation and obstruction of the urinary tract and prolapse of the rectum, vagina and uterus. From another group of 3,500 lambs receiving stilboestrol, approximately 10 per cent. died, showing prolapse of the rectum, vagina and uterus.

Wheeler & Hoffman (1948) reported prolapse of the cloaca and rectum of cockerels receiving a subcutaneous implant of 15 mg. stilboestrol. In the mouse, retention of urine and hydronephrosis associated with prostatic enlargement has been reported following prolonged oestrogen therapy (Burrows & Kennaway, 1934).

The histological examination of material from our cases showed changes similar to those associated with the administration of stilboestrol (Burrows, 1935), and of oestrin (Zuckermann, 1936) to male mice. Braude (1947a) reported that the administration of 50 mg. of stilboestrol daily for 89 days produced no histological changes in the reproductive tract of the boar.

The manifestations of the toxicity of stilboestrol can be better understood by a consideration of its metabolism and routes of excretion. Hanahan, Daskalakis, Edwards, Dauben & Meikle (1951) synthesized C^{14} diethystilboestrol, which was administered by subcutaneous injection to adult female rats. 77 per cent. to 98 per cent. of the radio-activity demonstrated was in the intestinal tract; 64 per cent. to 90 per cent. of this being from the bile. These workers recovered only 4 per cent. in the urine and they concluded that biliary excretions into the gut represents a main pathway of removal of excess oestrogen. In the rabbit, however, 35 per cent. of the administered oestrogen has been accounted for in the urine (Wilder-Smith & Williams, 1947). From comparative considerations it seems likely that the lesions we have observed in the pig occurred mainly at the sites of excretion of stilboestrol. This is further confirmed by the detection of an oestrogenic substance in the urine of these animals which does not appear in the controls.

The method employed for the detection of stilboestrol in the carcase and urine is considered to be very sensitive. Astwood showed a prompt rise in the uterine weight of immature female rats following a single injection of 0.1 μg. of oestradiol. At six hours after injection the uterine weight increased by approximately 70 per cent. and subsided within 48 hours. Evans, Hines, Varney & Koch (1940) have also shown the rat uterus to be very sensitive to a subcutaneous injection of menopause urine or pregnant mare's serum. Our findings are not in accordance with those reported by Braude (1950) who examined the meat of pigs receiving 40 mg. of stilboestrol daily using relief of symptoms in menopausal women as the criterion of oestrogenic activity. This material induced no oestrogenic effect in any of the patients. Our finding of a heat-stable oestrogenic substance in the carcases of these animals may affect the suitability of such material for human consumption.

Summary

A dietary supplement of stilboestrol (6 mg. per lb. of food) and thyroxine (0.3 mg. per lb. of food) was fed to 18 pigs with and without the addition of an antibiotic supplement, and these animals were compared with 18 control pigs. Under the conditions described:—

1. The stilboestrol-and-thyroxine supplemented pigs showed no increase in growth rate or food conversion compared with their controls.
2. The stilboestrol-and-thyroxine supplement did not increase the growth response obtained by antibiotic supplements.
3. Five cases of toxicity, three of them fatal, occurred in the stilboestrol-and-thyroxine-fed animals while none occurred in the controls. The symptoms could be reproduced by feeding stilboestrol alone at 20 mg. per lb. of food.
4. The *post-mortem* findings were in many ways similar to those reported in other species in cases of oestrogenic toxicity. The histological picture is very similar to that seen in the male mouse following continued oestrogen therapy.
5. A heat-stable oestrogenic substance was present in the carcases of stilboestrol-fed pigs which was not found in control pigs.

Acknowledgments.—The authors are grateful to Mr. I. M. Smith for the histological examination of the material described, and to Mr. F. H. Summerfield for the photographs.

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Continued on page 58 at foot of col. 2.

The Peter Wilson Lectures

We regret that consideration of space prevents us from publishing the full text of three lectures delivered under the Peter Wilson Bequest by Professor H. C. Bendixen in the Royal (Dick) School of Veterinary Studies on October 12th, 13th and 14th, 1954. We are indebted to Professor G. F. Boddie for the following precis.

LECTURE I

Experiences in Bovine Brucellosis and Mastitis with Special Regard to Eradication and Sanitation Measures

Tuberculosis

THE campaign against bovine tuberculosis in Denmark was started on the initiative of the late Bernhard Bang in 1892, but it was not until 1920 that the first Co-operative Creamery decided to have tuberculin tests performed on all the herds producing milk supplied to this creamery. From this small beginning area programmes developed, especially in the islands. In the early 1930s, all the co-operative dairy circles of the country (about 1,500) joined the official programme of organised collective eradication work. The cattle population of the country amounted to about 3,100,000 head distributed in a little over 200,000 herds so the average Danish dairy herd contained about 15 animals of which 7·5 were milking cows.

The growing interest in tuberculosis eradication was reflected in the laws of 1932 and 1942, which gave the Danish Ministry of Agriculture the necessary authority to establish rules for the performance and interpretation of tuberculin tests and for the certificates of sale. The Ministry was also authorised—on the recommendation of dairy districts in which more than 90 per cent. of the herds were tuberculosis-free—to command that the last infected herds should be submitted to a tuberculin test and the reactors sold for slaughter after the market value had been estimated. Furthermore, an official register was established covering all tuberculosis-free herds.

The campaign for eradication of bovine tuberculosis made such progress that by the late 1930s it was clear that the disease could be eradicated from Denmark if the programme was continued for a few more years.

Fig. 1. Graphical survey of the frequency of tuberculosis among slaughtered cattle, plotted on the basis of the statistical accounts published by the State Veterinary Directorate.

o--o--o adult cattle.

x--x--x slaughter calves.

Brucellosis

The success of the campaign against bovine tuberculosis lead to investigation to discover if bovine brucellosis could be eradicated by a similar campaign. It was found that many of the principles of the tuberculosis campaign could be applied to a scheme against brucellosis and in 1948 a bill dealing with bovine brucellosis was carried through the Danish Parliament. Prior to this, in the late 1930s brucellosis control work had passed from the stage of individual activity to co-operative programmes and interested dairy circles, especially in the islands, had started blood testing, etc. Under the guidance of the Veterinary Directorate, this voluntary work continued and soon good progress could be appreciated.

It is estimated that in 1940 about 25 per cent. of all herds contained reactors to the blood agglutination test, but great differences were found as between different circles.

The interest aroused by the campaign was such that more and more dairy circles decided to participate in the scheme and the executive committees have been able to apply pressure to owners who have shown no interest in taking an active part in the work. Now almost all the dairy circles co-operate.

There are four parties participating in the programme.

1. The farmers represented by the executives of the co-operative creameries. Their interests are centralised through the Joint Organisation of the Danish Co-operative Dairies which gives moral, practical and economic support.

2. The Government acting through the Veterinary Directorate guiding, stimulating, supervising and supporting the programme economically too.

3. The practising veterinarians who take part in local meetings and do all the professional work such as blood testing, supervising isolation and coping with local problems.

4. The research workers whose most important contribution was prior to the campaign but who still have to deal with problems such as doubtful cases, typing of strains and the development of new or improved diagnostic methods.

When a dairy circle decides to join the programme, an agreement is drawn up with the local state veterinarian representing the Veterinary Directorate of the Ministry of Agriculture. The dairy circle engages the local veterinarians to do the diagnostic work and the local veterinarians also function as advisers concerning the implementation of the programme in general.

If a dairy circle conforms to the rules, it is in a position to receive support from government funds. Half the cost of the veterinary work will be refunded by the State and all laboratory examinations (blood and milk samples, etc.) are carried out at an authorised laboratory free of charge.

When a certain amount of progress has been made within the area of a dairy the organisation concerned is supposed to join the so-called finalising plan. To this end a new agreement is made between the dairy circle and the veterinary administration. This provides that the dairy circle will terminate the eradication programme in all herds from which it draws milk in the course of not more than three years. If 90 per cent. of the cattle owners in a district vote in favour of total eradication of the disease the Ministry of Agriculture is authorised to force through the cleaning up of the few herds in the district that have not yet done so.

In March, 1953, 82 per cent. of all dairy circles had moved into the finalising stage and progress since then has been continuous. On October 1st, 1954, less than 3 per cent. of the herds in the whole country contained reactors and the organisations concerned are aiming at May 1st, 1957, as the date for the termination of the eradication plan.

Fig. 2 (overleaf) gives a survey until June, 1953, of the percentage of herds containing reactors.

From August, 1949, to July, 1953, 134,739 brucellosis reacting animals have been removed from herds and slaughtered. The owners have received compensation to the amount of 13,800,000 Danish kroner which is on an average 102·7 Danish kroner per animal.

The main principles followed in the scheme are :—

1. Measures of isolation and disinfection.
2. Removal of infected animals.
3. Vaccination.

The programme lays down that any owner who desires to vaccinate must have permission to do so from the Veterinary Directorate. The number of such permissions has been decreasing. In 1950–51, permission was granted to 7,406 herds and in 1952–53 it was only granted to 1,218 herds.

The Blood Serum Agglutination Test has from the beginning been used as a diagnostic method to detect infected animals and infected herds. Latterly, the Milk Ring Test (A.B.R.) has been used as an inexpensive but valuable supplemental test on a herd basis only.

The test is used as a running check on all herds under the official programme as all creameries are obliged to have the milk examined from each herd three times a year. Even after being registered as brucellosis-free the milk from such herds is continuously submitted to the Ring Test. In this way a reliable check is maintained on the situation in different districts. Blood testing of individual animals on a herd basis is still maintained as decisive before a herd is granted a certificate as being free from brucellosis.

Mastitis

After tuberculosis and brucellosis which have now been brought under control, the biggest of the chronic infectious disease problems troubling the dairy industry in Denmark is bovine mastitis. As the country is small the general conditions of cattle management do not vary much from district to district. Livoni (1953) examined the herds comprising five co-operative dairies which are considered representative of the country. This survey showed that 68 per cent. of the herds and 34·6 per cent. of the total number of cows were infected with streptococcal mastitis. Of these infections, 93 per cent. were found to be due to *Streptococcus agalactiae*. The remainder are partly haemolytic strains, *Str. dysgalactiae* and *Str. uberis*.

The economic importance of chronic streptococcal mastitis has been evaluated by Livoni in 1944, 1945 and 1953 on the basis of bacteriological examinations and milk yield records. The average loss in herds with an

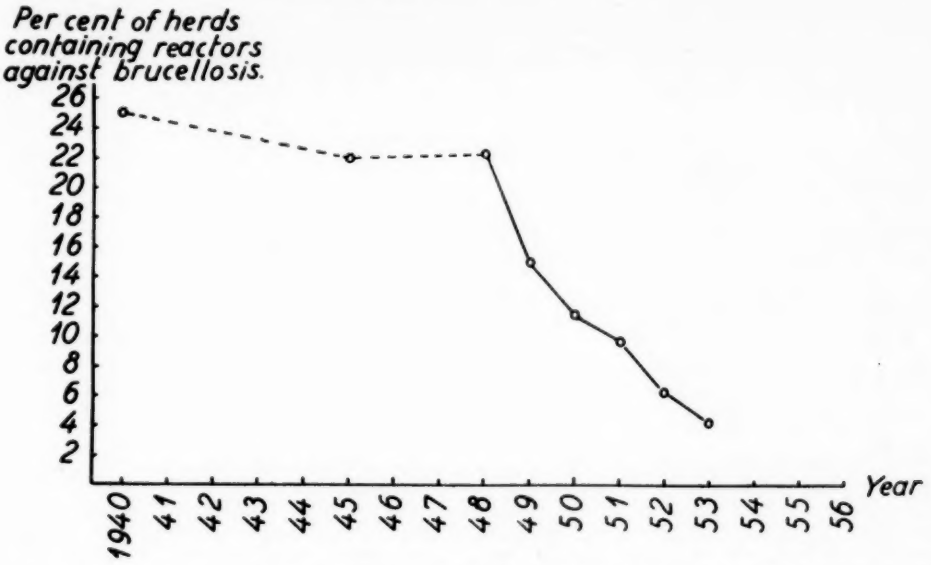

FIG. 2.—Survey of frequency of bovine brucellosis plotted on the bases of statistical accounts published by the State Veterinary Directorate.

average content of infection amounts to about 8 per cent. of the total milk yield of such herds. This figure should probably be regarded as the minimum average loss.

Though individual owners and some co-operative dairies have voluntarily joined projects for the control of mastitis, no broad based scheme comparable to that devised for the two previously mentioned diseases has yet been started for a number of reasons.

1. Though mastitis caused by *Str. agalactiae* may be by far the most important specific infection, its eradication would still leave the problem presented by other forms of mastitis.

2. The state of the buildings is important in that shelter, quiet and adequate warmth must be provided as well as conditions which will prevent many teat injuries.

3. The daily milking management is of vital importance. If the milking hygiene is not good, it will counteract any control measures.

4. The only reliable diagnostic tests are bacteriological cultural methods. These are both laborious and expensive. An organised mastitis campaign would require a number of laboratories spread over the country so that samples of milk could be easily and quickly delivered to them.

There are several commonly used cultural methods which give satisfactory and reliable results but so far it has not been possible to select one method as being definitely preferable to others. So-called primary seeding is used by several workers. Incubation methods are also popular and an inhibitor as *e.g.*, Sodium oxide to prevent multiplication of coliform organisms is used. In the Hotis Test, Brom-Cresol-Purple is added to indicate acid formation. Incubation methods are found to give too many positive infected quarters in massively infected herds. On the other hand some strains of *Str. agalactiae* are tather sensitive to inhibitors.

Using primary seeding methods, Livoni was in a trial lasting two years able to reduce the percentage of streptococcus infected herds from five co-operative dairy circles (comprising 712 herds and about 5,000 cows) from 68 per cent. to about 11 per cent. and the percentage of infected cows was reduced from 28·1 to 3·6.

Recently the Camp reaction described by Munch Petersen *et al.* in 1945 has attracted considerable attention in connection with mastitis control in Scandinavia. This reaction applied to can milk samples can be used as a screening test. In a two years' investigation of the herds from two co-operative creameries involving about 200 herds and 1,700 cows, Jepsen *et al.* (1954) reduced the herd infection with *Str. agalactiae* from 26·9 and 29 to 4·95 and 6·5 per cent. The percentage of infected cows was reduced from 9·3 and 10·8 to 1·1 and 0·5 respectively.

Treatment of infected udders with penicillin or other antibiotics is an important feature of control methods but not all animals are suitable for treatment, thus, it is not desirable to treat old indurated mastitis cases. There is a danger in depending too much on penicillin and other antibiotics. Extensive penicillin treatment has reduced the extent of *Str. agalactiae* infections in herds. At one time in Denmark 90 per cent. of pathogenic streptococci were found to be *Str. agalactiae*. In a recent trial involving 8,602 cows from 1,096 herds only 8·1 per cent. of infected cows were found to be excreting *Str. agalactiae* in the milk. This resulted from extensive penicillin treatment, but does by no means indicate that satisfactory sanitation of the udders had been obtained. Better stabling conditions and better management are necessary for the higher yielding dairy cow. Penicillin treatment is not by itself able to solve the mastitis problem. The principles of stabling methods and milking hygiene are fundamental factors

and, if they are neglected, disappointing results with penicillin treatment will sooner or later occur.

The extensive use of antibiotics has created problems or the creameries especially in connection with cheese making. It is now illegal in Denmark to send milk containing antibiotics to creameries. Only veterinarians are allowed to use antibiotics in the treatment of mastitis and every time such treatment takes place the creamery must be informed beforehand.

The introduction of penicillinase to milk containing penicillin is prohibited.

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LECTURES II AND III

Experiences in Diseases of Young Pigs in the Danish Pig Industry

Swine fever has not occurred in Denmark since 1932 and salmonellosis in pigs has not been diagnosed since 1936. Brucellosis in swine was diagnosed in 1928, 1940 and 1951, all outbreaks occurring in the same narrow district in North Jutland. A unique feature of the 1951 outbreak was the discovery of orchitis and epididymitis in two hares shot in the district. From these hares, brucella identical to the Danish strain of *Brucella suis* were isolated.

Bovine tuberculosis in swine is a thing of the past in Denmark. Fig. 1 gives a survey of the findings of swine slaughtered up to 1949. Since then the percentage has decreased to about 0·5 per cent. in 1953, but all the cases in 1953 were caused by the avian tubercle bacillus.

Small necrotic nodules caused by *Corynebacterium equi* are found in the cervical lymph nodes of some slaughtered pigs. *Trichinella spiralis* has not been found in Danish pigs since 1928. Swine erysipelas is the most important infectious disease met in pigs older than four months. Outbreaks were reported in 86,210 herds in 1950, 9,662 in 1951 and 32,553 in 1952.

The pig population in Denmark has shown marked fluctuation in the last 30 years, but the number of herds has remained relatively stable around 200,000 so it will be seen the fluctuations are reflected in the density of the pig population on the individual farms. There appears to be a close correlation between the density of the pig population and the incidence of certain diseases especially of young pigs, namely, gastro-intestinal disturbances and diseases of the respiratory organs.

All these observations stress the importance of environmental factors. These are particularly important for the very young and new-born pigs.

Reference was made to hypoglycaemia and iron deficiency in young pigs.

A possible manifestation of vitamin A deficiency in pigs is the appearance of anophthalmosis in pigs born from gilts in July, August or September. These have been mated from late February to May. The period of gestation takes place at the time of the year when the possibility of there being no vitamin A in the reserve depots is comparatively great owing to the general feeding system in Denmark. The parents of the gilts were apparently completely normal. It is remarkable that 92·3 per cent. of the affected litters were borne by gilts. In feeding experiments entailing vitamin A deprivation, it has been possible to reproduce the condition. A slaughter house survey suggested that 1 per cent. of all members furnishing pigs in the year 1944–45 were feeding such a vitamin A deficient diet.

In the affected pig, the globe of the eye though formed does not develop and the optic nerves are present as narrow strands. There are also deformities of the bones forming the orbits and optic foramina.

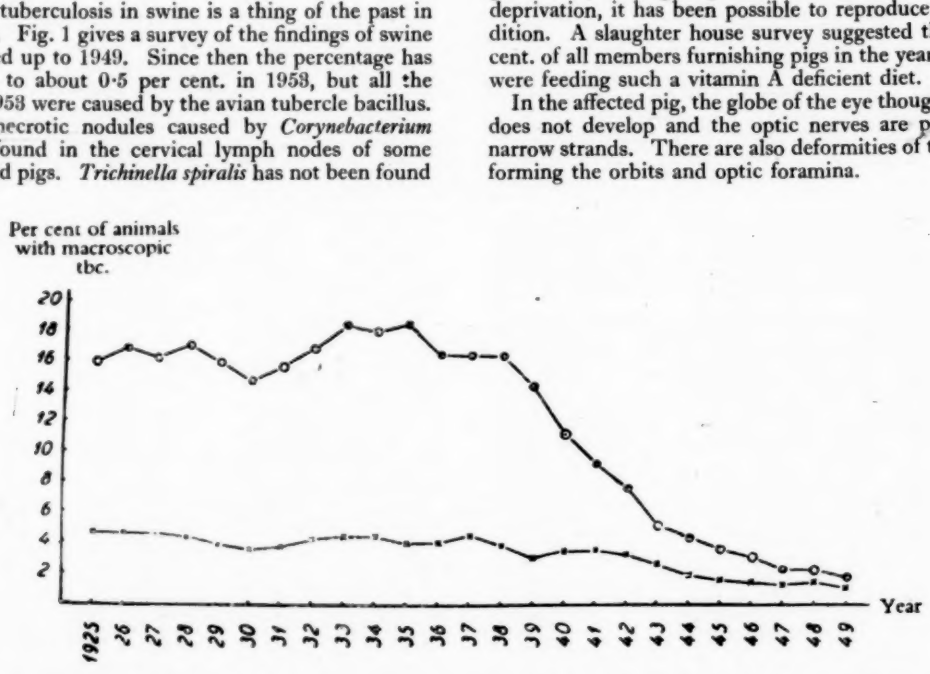

Fig. 1 Graphical survey of the frequency of tuberculosis among slaughtered swine, plotted on the basis of the statistical accounts published by the State Veterinary Directorate.

o--o--o: adult swine (sows and boars).

x—x—x: all swine.

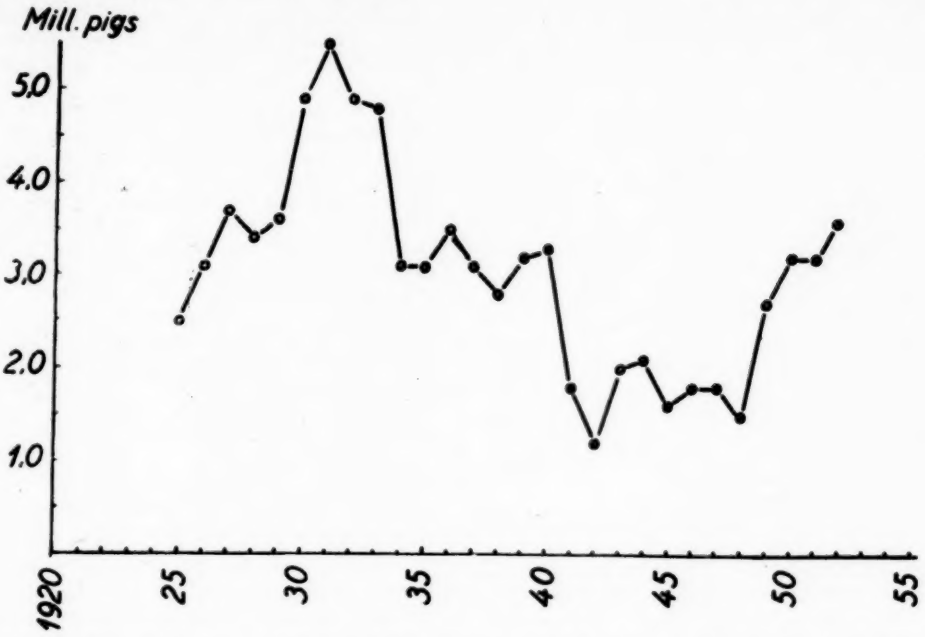

FIG. 2.—Number of pigs according to official censuses published by the Department of Statistics.

In baby pigs, as well as pigs in the post-weaning period, intestinal disturbances of a catarrhal type are the most common disease encountered by veterinary clinicians. There is no tendency to bacteraemia and "dietetic causes" associated with "aggressive intestinal flora" are supposed to be of causal importance. Though sulpha drugs have given some success in treatment, the most appropriate remedy appears to be the antibiotics as *e.g.*, Terramycin or aureomycin. The per oral dose aureomycin is 5 mg. twice a day for pigs until weaning; for the week after weaning, 10 mg. twice a day. Preliminary investigations suggest a dosing period of 10 to 20 days is enough.

An adequate state of nutrition and good hygiene, including climatic conditions in the buildings, are of fundamental importance to successful pig production. On this basis it seems as if the routine use of antibiotics as a supplement in the food is not economic. If the two fundamental points of nutrition and hygiene are neglected and antibiotic food supplements relied upon to correct defects, there is on the long view probably a risk of adaptation leading to the appearance of strains of organisms resistant to such chemicals.

During the years since 1950, there has in Denmark been an increase in the incidence of infectious pneumonia and rhinitis.

Enzootic pneumonia is often introduced to new herds by incautious purchases from other herds. Once introduced, the infection may remain in the herd for varying lengths of time. It is supposed that this virus disease is identical with that described by Hjarre *et al.* in Sweden in 1952 and Beveridge *et al.* in England in 1958.

Atrophic Rhinitis

Atrophic rhinitis was described more than 100 years ago by the German veterinarian Franque. Schneider described the disease in 1878 under the name "Schnüffelkranheit" (Snuffle disease).

Bang, in the 1880s, described the disease in Denmark where the disease was already known at that time. The lesions are those of atrophic alterations of the conchae and ethmoidal turbinate bones with varying degrees of modification of the form of the nasal cavity. Abnormal growth of the maxillary and nasal bones alters the external shape of the nasal part of the face giving an appearance like a bulldog's nose. The mucous membrane of the nose is the site of chronic inflammatory processes. The first signs of the disease are sneezing and snuffling. Epistaxis is common. Obstruction of the lachrymal ducts leads to a black-brown streak running down from the medial angle of the eye. No external signs may be seen before the pig reaches the age of 8 to 12 weeks. In mild cases, there is some retardation in weight development and the pigs are expensive to feed up to bacon weight. If enzootic pneumonia complicates atrophic rhinitis heavy losses may occur.

Some workers consider the primary cause of atrophic rhinitis to be of a hereditary nature or a nutritional deficiency. Many practising veterinarians in Denmark have maintained the point of view that it is primarily an infectious disease. Canadian and Norwegian workers have brought forward evidence that the cause is *Pasteurella multoidea* and that disease can only be produced when very young pigs are exposed, *i.e.*, three to five days old.

Enzootic Paresis

Enzootic paresis was first encountered in Denmark in 1949. This disease appears to give a pathological picture similar to but much milder than that described by Czechoslovakian workers under the name *Teschen*

Disease. Another outbreak of enzootic paresis was reported in Denmark in 1950. Subsequent enquiries revealed the presence of scattered outbreaks in 41 herds. There is reason to believe that the disease is not new in the country because in 1928–30 similar paretic pigs were found sporadically but it was then thought that the cause was some dietetic deficiency. Unpublished work of Aa. Thordal Christensen has shown that the disease is due to a filtrable neurotropic virus which can be transmitted by intranasal instillation. The virus is only recoverable from spontaneous cases during the first four days following the appearance of signs of paresis. Experimentally intracranial inoculation of pigs three to four weeks old shows an incubation period of 17 to 18 days. The morbidity rate is low ; often there are only one, two or three pigs affected in litters attacked. Following the appearance of cases in a herd, the disease may seem to disappear from that herd. In two large herds, a few scattered clinical cases were observed over a period of three years. The disease principally affects young pigs.

The affected animals show generally symptoms of sway back ; some are not able to walk but can move the limbs and so are able to crawl a little. In most cases, the appetite remains normal. A few pigs died in the first few days of illness. In from 7 to 20 days' improvement in the animal's condition appears. Histologically, it is possible to demonstrate cell infiltrations and neurophagia resembling those typical of an infection with a neurotropic virus (work yet to be published by Sjolte, I. P., & Bendixen, H. C.).

The following points form the basis for estimating the importance of the disease in Denmark. (1) The number of herds attacked is very limited. (2) The number of animals involved in affected herds is limited. (3) The death rate is low. (4) Affected animals improve and tend to thrive normally. (5) The disease promptly disappears from most herds. On the basis of these statements, it is understood that the present economic importance is limited.

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FIFTY YEARS AGO

The profession still numbers within its ranks some skilled horsemen, notably among the officers of the R.A.V.C. Fifty years ago, however, equestrian ability was regarded, at least by some veterinarians, as being *de rigeur*. In THE RECORD of January 7th, 1905, a correspondent wrote:

At this time when the question of curriculum and University education is being passed from mouth to mouth, it may not be out of place for us to consider if there really is any study whose omission from the education of the veterinary student, unless he were proficient in it, might prejudice him in the practice of his profession. I refer to the question of horsemanship. Let us consider what horsemanship means to a veterinary surgeon. Can a veterinary surgeon always give a reliable opinion on a disputed case of soundness in wind without riding a hunter? A client asks his veterinary surgeon's opinion of the soundness of a horse and his fitness for hunting and saddle work—how can a man judge the actions and paces of a hunter without riding him?

Of course every veterinary surgeon has his own way of testing a horse's wind, and it may be by no means in every case necessary to be on his back to hear him, provided he is fairly ridden by somebody else; but in disputed cases one cannot be too thorough. When mounted one can hear every inspiration, whereas if you are not on his back you only hear them when he is within hearing distance, which is a distinct disadvantage.

It must be a humiliating position for a veterinary surgeon to have to ask a groom to gallop a horse for him, he knowing all the time that he cannot ride. I do not mean to say that every veterinary surgeon should be an accomplished steeplechase rider, but what I do say is, that unless he is prevented by any infirmity, he should at any rate be sufficiently well versed in horsemanship to be able to test a disputed hunter's wind thoroughly. A student of the present day has to pass an examination in stable management, and I do not see what is to prevent riding being included in this subject—it should not be difficult to arrange, and would often save a man later from ridicule at the expense of his client.

ADDENDUM

Continuation from page 52 of article by J. H. Taylor and W. S. Gordon.

The publication of this paper has been delayed for a year pending publication of the results of the co-ordinated trials. During this period many reports of the use of stilboestrol to increase growth rate have appeared, some of which support our present findings.

Bell, Smith and Erhart (1954) gave two implants of 15 mg. of stilboestrol to lambs at an interval of 70 days and reported the loss of 12 animals " from prolapse of the rectum and from excessive swelling and inflammation in the rectal or perineal region, or showing symptoms similar to those produced by urinary calculi." Nearly all the treated lambs showed preputial swelling and enlargement of the bladder, seminal vesicles, urethra and prostate gland.

Stob, Andrews, Zarrow and Beeson (1954) have demonstrated the presence of residual oestrogen in the tissues of steers, lambs and chickens given a stilboestrol implant. Using a test based on an increase of uterine weight in castrated mice, oestrogens were demonstrated in the meat of steers up to 140 days after implantation. This oestrogenic activity was not reduced by cooking the meat at 120° to 150° C. for two hours.

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Pine (Cobalt Deficiency) in Lambs

BY

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Introduction

THE importance of cobalt in the diet of sheep has been proved by Lines (1935), Underwood & Filmer (1935), Marston *et al.* (1938), Bowstead & Sackville (1939), Keener *et al.* (1948) and many other workers. Little progress appears to have been made in determining the function of cobalt in the diet of ruminants, until Rickes *et al.* (1948a) isolated vitamin B_{12} and Smith (1948a) also reported the isolation of the anti-pernicious anaemia factor. In the same year Smith (1948b) showed the anti-pernicious anaemia factor to be a cobalt complex and Rickes *et al.* (1948b) published a similar finding. This discovery marked an important advance in determining the function of cobalt in animal nutrition.

It is generally believed that cobalt has an essential function in the production of some sort of appetite-stimulating factor by the flora of the rumen. The principal reason for this belief is based on the finding that cobalt deficiency has been found only in ruminants. McCance & Widdowson (1944) concluded that injected cobalt, unlike that administered orally, has not been effective in relieving the deficiency. Ray *et al.* (1948) reported that the oral administration of cobalt salts to cobalt-deficient sheep brought about a rapid increase in the appetite and bodyweight, but the injection of cobalt salts gave a slower response. Tribe & Osborne (1954) reported that they have cured four lambs suffering from borderline cobalt deficiency by either injecting vitamin B_{12} or by the oral administration of cobalt. They also pointed out that cobalt deficiency can be complicated by a heavy worm infestation.

After observing a pining condition in a group of six lambs used in another investigation, it was decided to investigate the possibility of inducing cobalt deficiency in lambs and to determine the effect of feeding faeces collected from clinically normal sheep.

Observations

In May, 1953, six lambs about eight weeks old were obtained from a Hertfordshire farm; they were all in good condition. They were brought to the London School of Hygiene and Tropical Medicine for the purpose of carrying out experimental infection with *Sarcocystis tenella*. The six lambs were divided into three groups of two animals each. They were fed a daily ration composed of hay, crushed oats and flaked maize. At about the age of 15 weeks lamb No. 4 showed a marked loss of appetite and appeared dull. Then cough developed, the fleece was dry, the animal was gradually losing strength, and finally due to extreme weakness it was unable to rise. There was some diarrhoea which suggested nematode worm infestation. The other five lambs appeared dull with reduced appetite, but in no way so affected as lamb No. 4. Faecal samples were collected from each lamb and worm egg counts carried out. Lamb No. 4 presented 4,800 eggs per gramme, the other lambs varied from 2,000 to 2,500 eggs per gramme. All animals were dosed with phenothiazine, but in spite of the marked drop of the egg count there was no improvement. Lamb No. 4 became extremely emaciated, the conjunctiva was pale with ocular and nasal discharge, and the animal finally died.

The *post-mortem* findings were those of anaemia and emaciation. Loss of flesh was great and on opening the chest cavity there was a large amount of pericardial fluid. The abdominal organs appeared pale, except the small intestine which was slightly inflamed. The lymph glands were enlarged and oedematous.

The above symptoms and *post-mortem* findings suggested " pine " (cobalt deficiency) superimposed with nematode worm infestation.

Daily administration of 5 mg. cobalt chloride per lamb as a drench was carried out for 14 consecutive days. This type of treatment brought about immediate recovery response. The animals recovered their appetite and their physical condition gradually returned to normal.

Experiment

In February, 1954, 12 lambs one to two days old were obtained from two farms in Hertfordshire. As far as is known cobalt deficiency has not been observed on either of the two farms. The lambs were divided into two groups, A and B, and raised on milk. Group A of four lambs received 5 mg. cobalt chloride per lamb twice weekly. Group B of eight lambs was raised on milk only. After weaning the basic daily ration used was 2 lb. of equal parts of flaked maize and crushed oats per animal. Hay was freely given and a plain salt brick was kept before each group of animals. When weaned at 10 weeks of age, group B was divided into two groups, B and C of four lambs each. The four lambs in group B were given faeces collected from clinically normal sheep in addition to the basal ration. The faecal supplement was given to the lambs by preparing a paste of faeces mixed with water and thoroughly mixing it with the concentrate. At 10 weeks of age all the lambs were given 1½ lb. concentrate per lamb. The ration was steadily increased till at the 16th week they were receiving 2 lb. concentrate each. Thus the three groups of animals were as follows: Group A, supplemented with cobalt from the day of their arrival. Group B, supplemented with faeces after they had been weaned. Group C, kept on the basal ration only.

Results

Lambs receiving cobalt or faecal supplements, made steady gains in weight and showed no symptoms of deficiency. Lambs fed on the basal ration only made steady gains up to the 14th week, but by the 21st week they showed symptoms of cobalt deficiency. At this stage they were consuming approximately one third of the normal amount of food, there was loss of weight and their physical condition was generally poor.

The average gains in weight during the experiment (21 weeks) and the average concentrate consumption is shown in the following table:—

Group	Number of animals	Diet	Weight gains and food consumption, lb.	
			Average total gain in weight	Average daily consumption of concentrate
A	4	Basal + cobalt	52·1	1·8
B	4	Basal + faeces	47·8	1·65
C	4	Basal	16·2	0·6

When the lambs in group C reached this stage of deficiency they were given 5 mg. cobalt chloride as a drench for 14 consecutive days. It was noted that the cobalt relieved the condition in every case. The first response noticed was an increase in food consumption. The physical condition of the animals then gradually returned to normal. The length of time from the first treatment to the first indication of response varied from three to five days.

Discussion

These results, which indicate that cobalt deficiency can be induced experimentally in lambs and substantiate the work of Keener *et al.* (1948) and Stewart (1951), showed that faeces collected from clinically normal sheep when fed to lambs can prevent the occurrence of cobalt deficiency. Maynard (1951) reported that rumen synthesis of vitamin B_{12} has been induced in sheep experiments. Large amounts of the vitamin appear in the faeces of both cattle and sheep. He added that it has been shown that a concentrate referred to as "cow manure factor" owed its activity to its vitamin B_{12} content. Dawbarn *et al.* (1952) concluded that it would seem that there are at least two "B_{12}-like factors" in sheep faeces and that their absolute and relative concentration depends upon the level of available cobalt in the gut. It seems highly probable that the lambs in group B showed no deficiency because of the presence of vitamin B_{12} or unabsorbed cobalt in the faeces of sheep.

The tabulated data show that the average increase in bodyweight for those lambs which had received cobalt was nearly 3.2 times that of the non-cobalt animals; and that the average increase in bodyweight for those lambs which received faeces was about three times those of the non-cobalt animals. The average concentrate consumption of the lambs on the basal diet alone was nearly three times less than those supplemented with either cobalt or faeces.

Lambs receiving no cobalt supplement made apparently normal progress till about the 14th week, when their weight remained steady or decreased. All lambs kept on the basal diet made an immediate recovery response to cobalt chloride when administered orally in the rate of 5 mg. per lamb for 14 consecutive days. The length of time before response to cobalt dosing was observed, varied in the four treated lambs but the average time was about four days. Lambs in group C gained an average of nearly 18.6 lb. in nine weeks when cobalt chloride was administered for 14 consecutive days and then twice weekly throughout this period.

A condition of pining in lambs was observed, which in one case was acute and superimposed with nematode worm infestation which led to the death of the animal. It was assumed in the preliminary observations that the pining was due to maintaining the lambs on a cobalt deficient diet.

Summary

(1) Lambs kept on a basal ration composed of flaked maize, crushed oats and hay showed symptoms of cobalt deficiency, but made immediate response when cobalt was administered at the rate of 5 mg. per lamb as a drench for 14 consecutive days.

(2) Lambs given the same basal ration with a supplement of 5 mg. cobalt twice weekly or a supplement of faeces from normal sheep, gained weight normally and showed no symptoms of deficiency.

(3) An acute case of pining superimposed upon nematode worm infestation was recorded.

Acknowledgments.—My thanks are due to Professor P. C. C. Garnham and Dr. W. E. Ormerod of the Department of Parasitology; to Miss M. W. Grant of the Department of Nutrition; and to the staff of Winches Farm and the Animal House of the London School of Hygiene and Tropical Medicine.

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Current Literature

ABSTRACT

The Radio-Telephone in General Practice. HODGKIN, K. (1954). *Lancet*, December 25th, p. 1323.

This article describes the working of a car to surgery (and reverse) radio-telephone in a general medical practice covering two urban areas ten miles apart with a number of rural patients in between.

With an aerial 40 feet high the range of the apparatus is about 12 miles, but there are some known dead areas on the outer limits.

The installation consists of a fixed set in the surgery, an extension control unit in the caretaker's house and a mobile unit in the car. The cost of this was about £400 which, like the cost of a car, is subject to income-tax relief. The cost of the licence for the fixed unit is £6 and for the mobile unit is £3 per annum.

Maintenance is carried out at a fixed charge of six shillings per week per set.

Permission to install the apparatus must be obtained from the G.P.O. who allocate a wave-length.

The apparatus has proved satisfactory and has been effective in saving time and car mileage.

G. F. B.

BOOK REVIEW

The Practice of Veterinary Medicine, by D. H. UDALL. Sixth edn. 1954. Pp. 811. Illustrations, 116. Published by the author at Ithaca, New York. Obtainable in Great Britain from Baillière, Tindall, & Cox, Ltd., London. Price 65s.

First published in 1933, Udall's "The Practice of Veterinary Medicine" has in 21 years reached its sixth edition. This in itself indicates how successfully the need for such a book has been met by Udall's publication. The demand, however, is not confined to the English-speaking parts of the world for a Spanish translation was published in 1946.

In reviewing a new edition of an established text-book two purposes must be served. The scope and character of the book must be inidcated for those who are not familiar with it. The changes made in the new edition must be indicated for those who possess the earlier edition and wish to have some guide as to whether they should purchase the latest edition.

The book is essentially one dealing with diseases of farm animals, horses, cattle, sheep and pigs. It is based on many years' practical experience guided by an acute clinical acumen and governed by a sound common-sense outlook. The writer has made an extensive survey of the world literature of his subject. He does not attempt to give a complete list of references, but rather makes use of a restricted range of references dealing with what he considers are the more salient publications on particular subjects. The list of references is sufficient for the average person who wishes to read more widely on any subject and from it he can quite easily extend his range of reading.

There has been an increase in size from 571 pages in the fifth to 811 in the sixth edition ; the number of illustrations has increased by eight.

The author points out the difficulty of estimating where to omit the old and begin the new. In this respect he has taken a middle course by postponing omissions and yet making an effort to keep up with the new. By and large, the course adopted by the author has been successful. He has taken the opportunity when preparing the sixth edition to make some re-arrangement of the text. Thus the sections on sarcoptic and chorioptic mange have been combined in one. The section on contagious pustular dermatitis has been extended and has been removed from under the heading of skin diseases to a more appropriate place under virus diseases. The section on fluorosis, previously entitled fluorine poisoning, has been extended. A short section on caustic alkali poisoning has been omitted. Ulcerative stomatitis and oesophagitis, formerly found under miscellaneous diseases, is now placed under virus diseases.

There are a number of additions in this edition including sections on atrophic rhinitis, sheep pneumonia, chronic progressive pneumonia in sheep, transmissible gastro-enteritis in baby pigs, infectious hepatitis in horses, leptospirosis, scrapie, blue-tongue, poisoning with insecticides and trichlorethylene, bovine hyperkeratosis, displacement of the abomasum and a table of normal laboratory values of clinical importance.

In the section on mastitis, the part dealing with bacteriology has been extensively rewritten to conform to the more recent views thereon. The parts dealing with control and treatment have been revised. A new portion of over three pages gives recommended treatments for bovine mastitis as issued by the New York State Veterinary College under the New York State Mastitis Research and Control Programme.

If a reviewer might venture one criticism, it is to comment on the use of the term *actinomycosis* to describe both *actinomycosis* and *actinobacillosis*. This leads to contradictory statements, such as : "*Actinobacillus lignieresi* is the usual cause of actinomycosis of the soft parts of the head." "Actinomycosis of the tongue is marked by salivation and difficult mastication." "Potassium iodide exerts a specific curative effect in many cases of actinobacillosis." "Sodium iodide intravenously has proved effective and convenient in the treatment of actinomycosis of the soft parts not involving bone."

There is a good index, in which one small error was noticed. Sodium *fluoride* in Ringworm, page 345, should read sodium *iodide*.

The book is well printed in clear type on good quality white glazed paper. The binding is tasteful and the book opens readily at any selected place, suggesting that the spine is both strong and flexible.

APPOINTMENTS AT LIVERPOOL

Mr. H. E. Ritchie, B.V.SC., M.R.C.V.S., who was recently appointed Lecturer in Veterinary Medicine (Farm Animals) in the Faculty of Veterinary Science of the University of Liverpool took over his duties on December 1st, 1954.

Mr. A. I. Wright, B.V.SC., M.R.C.V.S., has been appointed to a Scholarship in Veterinary Parasitology and Pathology. The tenure of the Scholarship is to be for two years.

News and Comment

DR. E. L. TAYLOR HONOURED

In the New Year Honours List the Queen was graciously pleased to confer the dignity of C.B.E. on Dr. E. L. Taylor, deputy-Director of the Ministry's veterinary laboratory at Weybridge. Dr. Taylor's name appeared in the Prime Minister's List.

As most readers may know, Dr. Taylor is distinguished for his work in veterinary parasitology. He has taught and studied in France and the United States as well as in this country. He graduated at Liverpool in 1923, from which university he was subsequently granted the doctorate of veterinary science. The B.V.A. awarded him the Dalrymple-Champneys cup and medal in 1947. He joined the staff at Weybridge in 1927, became Senior Research Officer in 1938, and deputy-Director in October, 1952.

UNIVERSITY OF CAMBRIDGE

Veterinary Examination, First Part, December, 1954

The following have passed the whole examination:—

Alexander, F. C. M. (Caius College); Edwards, B. L. (Caius College); Fussell, M. H. (Sidney Sussex College); Gould, A. C. (Trinity Hall); Ogilvie, T. W. B. (Trinity Hall); Watson, F. I. (Trinity College); Wood, E. N. (Emmanuel College).

Passed in two sections of the Examination (*Veterinary Parasitology* and *Animal Health*):—

Brambell, M. R. (Christ's College).

Passed in one section of the Examination (*Animal Health*):—

Kingsberry, D. L. (Magdalene College. Has previously passed in Veterinary Parasitology).

CAREERS WITH ANIMALS

At a meeting arranged by UFAW (The Universities Federation for Animal Welfare) during the Conference of Educational Associations at University College, London, on December 31st, 1954, Professor J. McCunn spoke about veterinary science as a career. In the course of his address Professor McCunn said:—

"To devote one's life to the relief of suffering and distress, which so often affects animals, is a noble task. It calls forth and enhances the qualities of love, mercy and compassion and demands a life of unremitting service, though the reward, measured by material standards, is not in proportion to the sacrifice of time and energy involved. Now let us look at the other side of the picture. It would be a poor world if we were all to measure our chosen career in terms of material reward. There are other things which transcend base economics. If we love our job then our work can never be irksome, we can experience great joy when we are able to bring relief to some dumb creature, and a life well spent on such a task can never be mean or paltry and the gratitude of our patients and their owners can bring a glow to our hearts and minds every hour of the day. Sentiment is a gracious virtue but sentiment alone is not a sufficient qualification or inducement to justify a boy or girl entering the veterinary profession. I feel that I must give this warning to those of you who have thoughts of a career in the veterinary profession.

"I have been a veterinary surgeon for 36 years and if I had my time over again I would still choose to follow that vocation, for my work has been full of variety, it has been arduous but I have enjoyed every minute of it. My work has been my pleasure and what could be better in life than to enjoy working at your job?"

Professor McCunn then described in some detail the educational qualifications required of the veterinary student, the enrolment at a university and the scope of study for the professional examinations. He went on:—

"Examinations are the bane of the student's life. Ever since I can remember the examination system in schools, colleges and universities has been the subject of severe criticism, but unfortunately the wit of man has not evolved a satisfactory substitute. Many pass who might easily have failed and many fail when the measure of their intelligence and knowledge is equal to that of those who are fortunate. Examinations are a necessary evil and you must pass them if you are to attain your goal. Failure in an examination is not an indication that you are a 'dud,' but under present circumstances if you fail twice in a subject in the early years and three times in the later years then you forfeit the right of further study and have to renounce your ambition to become a veterinary surgeon.

"I think this rule is far too harsh, for, to my mind, the vocational urge is much more important in the making of a good veterinary surgeon than any academic test can ever be.

"When you are qualified you will find that there are many avenues which you can follow and explore. There are few professions in which the variety of outlook and endeavour is so great.

"If you are sincerely interested in animal welfare I can assure you that the variety of jobs available is so diverse that there should be no difficulty in following a line which will satisfy your own particular desire. There is very little fear that you may lack employment, for there are so many doors that if one closes, temporarily or even permanently, one of the others can be opened with ease.

"Finally, a word on the economic aspect; you cannot make a great fortune but given good health and moderate ability you can be assured of a reasonable reward."

Professor McCunn's talk was followed by one from Dr. W. Lane-Petter, who described the work of the animal technician.

FOWL PEST IN NORFOLK

In view of the continued high incidence of fowl pest in the central parts of Norfolk and the occurrence of numerous outbreaks of disease at places close to, but outside the present scheduled area, it has been decided to extend that area. Accordingly, the Minister has made The Live Poultry (Mid-Norfolk) (Amendment) Order, 1955, which came into operation on Wednesday, January 12th. The new area is as follows:—

The City and County Borough of Norwich (including the detached parts of the parish of Thorpe next Norwich).

In the County of Norfolk—The petty sessional divisions of Eynsford, and Mitford and Launditch. Petty Sessional Division of South Erpingham:—The parishes of Marsham, Hevingham, and Stratton Strawless. Petty Sessional Division of Taverham:—The parishes of Hainford, Horsford, Felthorpe, Attlebridge, Taverham, Drayton, Horsham St. Faith with Newton St. Faith, Spixworth, Catton, Hellesdon, Costessey, Bawburgh, Colney, Little Melton, Great Melton, Hethersett, and Cringleford. Petty Sessional Division of Forehoe:—The parishes of Honingham, Easton, Marlingford, Barnham Broom, Runhall, Barford, Kimberley, Wramplingham, Wicklewood, Deopham, Morley, and Hingham. Petty Sessional Division of Cuiltcross and Shropham:—The parishes of Great Ellingham and Rocklands. Petty Sessional Division of Wayland:—The parishes of Carbrooke, Scoulton, Watton, Griston, Caston, Thompson, Little Ellingham, Merton, and Stow Bedon.

COMING EVENTS

Jan. 21st.—Annual General Meeting of the Mid-West Division, B.V.A., at the Berkeley Cafè, Clifton, 2.30 p.m.

Jan. 26th.—General Meeting of the Lancashire Division, B.V.A., in the University Veterinary Hospital, Pembroke Gardens, Liverpool, 2.30 p.m.

Jan. 27th.—Annual Dinner-Dance of the North of Scotland Division, B.V.A. (in aid of the Victoria Veterinary Benevolent Fund), in the Northern Hotel, Aberdeen, 7.30 p.m.

Jan. 27th.—Special Meeting of the Hert sand Beds Division, B.V.A., at 70, Holywell Hill, St. Albans, 7.30 p.m.

Jan. 28th.—Annual General Meeting of the Yorkshire Division, B.V.A., in the Hotel Metropole, Leeds, 2.30 p.m.

Feb. 2nd.—Ordinary General Meeting of the Sussex Division, B.V.A., at the Old Ship Hotel, Brighton, 2.30 p.m.

Feb. 10th.—Annual Ball of the Royal (Dick) School of Veterinary Studies in the Assembly Rooms, George Street, Edinburgh, 8.30 p.m.

B.V.A. QUARTERLY MEETINGS

The arrangements for January are:—

Wednesday, January 19th.

10.15 a.m. Organising Committee.
2.0 p.m. Home Appointments Committee.
4.0 p.m. Parliamentary & Public Relations Committee.

At 7, Mansfield Street, W.1.

Thursday, January 20th.

10.30 a.m. Veterinary State Medicine Committee.
2.0 p.m. General Purposes & Finance Committee.

At 7, Mansfield Street, W.1.

Friday, January 21st.

10.30 a.m. Council meeting.

At the Connaught Rooms, Gt. Queen Street.

PERSONAL

Engagement

PHILLIPS—SHIPLEY. — The engagement is announced between George D. Phillips, B.SC., B.V.SC., M.R.C.V.S., of Leahurst Weston, Wirral, and Eleanor Myra Shipley, of Alsager, Cheshire.

R.C.V.S. OBITUARY

ELLSE.—Joseph Bowen, of 119, Nottingham Road, Derby. Graduated Edinburgh, December 14th, 1942, died January 4th, 1955, aged 65 years.

COMMITTEE ON PIG PRODUCTION

As the Minister of Agriculture announced in Parliament on December 1st, it has been decided to appoint a Committee under the chairmanship of Sir Harold Howitt, G.B.E., with the following terms of reference: "To advise in what ways pig production would best be developed, particularly in regard to general breeding policy and production methods, in the light of prospective market requirements for pork and bacon in the United Kingdom."

The other members of the Committee will be:—Mr. G. R. H. Bishop, who is attached to the Animal Breeding and Research organisation of the A.R.C. in Edinburgh; Mr. E. R. Gunner; Dr. J. Hammond, C.B.E., F.R.S., who was, until September, 1954, Reader in Agricultural Physiology at Cambridge, and honorary director of the A.R.C. Unit of Animal Reproduction; Mr. F. Lawson; Mr. H. W. Long; and Mr. J. Sainsbury.

MINISTRY OF AGRICULTURE VETERINARY FIELD STAFF

Mr. J. R. Mitchell, M.R.C.V.S., Veterinary Officer, has been transferred from Llandrindod Wells to Leeds; Mr. R. A. Richards, B.V.SC., M.R.C.V.S., Veterinary Officer, has been transferred from Caernarvon to Bridgend; and Mr. J. M. Threlkeld, M.R.C.V.S., Veterinary Officer, has been transferred from Northallerton to Redcar.

The following MS.R.C.V.S. have been appointed to the permanent staff as Veterinary Officers:—

Messrs. F. W. Aston, D.V.S.M., stationed at Weybridge Laboratory; I. B. Dick, stationed at Lincoln; A. Gibson, stationed at Cupar; B. M. Gregory, stationed at Truro; A. C. Harkness, stationed at Carlisle; M. Horseman, B.SC., stationed at Birkenhead Port; P. A. G. Leach, stationed at Hertford; T. P. Lindsay, stationed at Inverness; A. H. Miller, stationed at Preston; H. V. Morris, stationed at Ruthin; W. A. Murdoch, stationed at Durham; J. H. Ockey, stationed at Shrewsbury; W. Uruski, stationed at Northallerton.

THE 1955 HEALTH CONGRESS

The preliminary programme of the Health Congress, organised by the Royal Sanitary Institute, has been received. The Congress will be held at Bournemouth from April 26th to 29th.

The President of the veterinary hygiene section will be Dr. A. W. Stableforth. After his opening address the following papers will be read during the afternoon of Tuesday, April 26th.

"Post-Mortem Changes in Meat," by J. M. Olivant, M.R.C.V.S., D.V.S.M., Lecturer in Applied Veterinary Pathology, University of Liverpool.

"Mastitis in the Dairy Cow—its Agricultural and Public Health Importance," by S. J. Edwards, D.SC., F.R.C.V.S., Senior Principal Scientific Officer, Agricultural Research Council Field Station, Compton.

THE CENTAUR

We are obliged to the Editor of this, the magazine of the Royal (Dick) School, for sending us a copy of the December issue. This is a lively and topical publication, well put together, including some amusing line drawings, and carrying an enviable amount of advertisement. The latter, no doubt, makes possible the production of so comparatively large a journal, comprising 52 pages and a coloured (we refer to it with diffidence) cover. The humour, of which there is not a little, is perhaps more notable for robustness than for subtlety, but among it the following agreeable quatrain caught the eye:

Why does Burgess
Always urgess
To give a prognosis
When God knowis?

We look forward to receiving the journals of other Schools as they appear.

DINNER AT CUPAR, FIFE

Meetings which have been held over a period between local veterinary surgeons of Cupar, Fife, and members of the staff of the Animal Health Division in the district, when matters of common interest were discussed, blossomed out into a formal dinner on December 15th. At the Lundin Links Hotel 110 guests assembled, including representatives of all local organisations having interests in livestock, to enjoy a convivial evening under the chairmanship of Mr. J. Gordon Souter, the D.V.O. By common consent the evening was voted a complete success and a very happy social innovation.

ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax:

Cumberland. Prospect House, Pelutho, Silloth, Carlisle (Jan. 6).

Durham. West Farm, Old Shotton, Castle Eden (Jan. 5).

Leics. Friars Well Farm, Wartnaby, Melton Mowbray; Brook Farm, Osgathorpe, Loughborough (Jan. 6).

Northumberland. Office Farm, Whitfield, Hexham; High Burnfoot, Haltwhistle (Jan. 1); Shawdon Hall Farm, Glanton, Alnwick (Jan. 5).

Notts. Botany Bay Farm, Babworth, Retford (Jan. 3).

Yorks. Union House, Skeeby, Richmond (Jan. 3); Meaux Decoy Farm, Meaux, Beverley (Jan. 4).

Fowl Pest:

Beds. Hockcliffe Dairy Farm, Hockcliffe, Leighton Buzzard (Jan. 4).

Cambridge. Schole Road Premises, Willingham (Jan. 3).

Essex. Warners Farm, Gt. Waltham, Chelmsford (Jan. 3).

*Glouc*s. North Road Bungalow, The Reddings, Cheltenham (Jan. 6).

Hunts. Bulls Farm, Woodhurst and Church Farm, Woodhurst, Huntingdon (Jan. 2); Brown's Allotments, Pig Lane, St. Ives, Huntingdon (Jan. 5).

Lincs. 31, East Street, Horncastle (Jan. 4).

Middx. 53, Leacroft, Staines (Jan. 3).

Norfolk. West End Farm, Old Costessey, Norwich; Low Road, Tuddenham, East Dereham (Jan. 2); No. 5, The Turn, Hevingham, Norwich; Wensum Farm, Elsing, Dereham (Jan. 4); Robins Nest, Beach Road, Caister-on-Sea, Gt. Yarmouth (Jan. 6).

Swine Fever:

Cardigan. Gwyrthwynt Uchaf, Talsarn, Lampeter (Jan. 4).

Ches. Dig Lane, Acton, Northwich (Jan. 5); Bridge Farm, Baddington, Nantwich (Jan. 8); Cheerbrook Farm, Newcastle Road, Willaston, Nantwich; Elms Farm, Parkgate Road, Mollington, Nr. Chester (Jan. 10).

Denbighs. Honckley Hall, Burton, Nr. Rossett, Wrexham (Jan. 10).

Devon. Colebrook Orchard, Bovingdon Hill, Colebrook, Plympton, Plymouth (Jan. 4).

Flints. Top-yr-Allt, The Mill, Treuddyn, Mold (Jan 8).

Glamorgan. Castell Croch Woods Quarry, Castle Road, Tongwynlais, Cardiff (Jan. 6).

Hereford. The Court, Woolhope, Ledbury (Jan. 10).

Kent. Vauxhall Farm, Tonbridge (Jan. 6); Grove Farm, East Peckham, Tonbridge (Jan. 10).

Lancs. Butlers Arms Farm, Kirkland, Garstang, Preston (Jan. 5); Higher Barn Farm, Birch, Heywood (Jan. 6).

Monmouth. Holly House, Penhow, Newport (Jan. 4); 3, Stockton Road, Newport (Jan. 10).

Montgomery. Glanllyn, Llanfihangel, Llanfyllin (Jan. 5).

Staffs. Shortwood, Standon (Jan. 6).

Suffolk. Glebe Farm, Bucklesham (Jan. 8).

Sussex. Gatwick Manor Farm, East Grinstead (Jan. 8).

Worcs. Church Farm, Rectory Lane, Rock, Kidderminster (Jan. 5).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

CANINE DISTEMPER

Sir,—I enjoyed reading the admirable articles by Lauder *et al.* (*Vet. Rec.* **66.** 607 & 623) on canine distemper. They say that according to Jenner (1809) distemper was first recognised in Britain during the 18th century.

I have few historical books available, but it may be of interest to elaborate this statement by quoting from the account by Fleming (1875) in his outstanding *Manual of Veterinary Sanitary Science*, Vol. II, p. 288.

" In 1760-63, there was a great and general mortality among dogs in Spain, which is supposed, and with every probability, to have been this disease imported from South America; at which time, also, it appears to have been noticed in North America.

" In 1763, it appeared in England and France, and both countries believed they had received it from each other. It was very widespread and fatal, and quite novel; and the nervous symptoms which sometimes accompany it caused many people in this country to think it was rabies, and to destroy their dogs."

He briefly described the spread of the disease in Europe, and refers to a detailed account in Fleming's *Animal Plagues* of outbreaks in Siberia in 1821, that "proved most disastrous to the canine species." Apparently distemper was very common in Australia and New Zealand in 1875.

We tend to think of distemper as a universal disease, but the above account shows that, as with other epizootics (*Vet. Rec.* **60.** 361), large areas of the world were often unaffected before the days of modern transportation.

Yours faithfully,

JOHN FRANCIS,

Department of Preventive Medicine,
The Veterinary School,
University of Queensland,
Brisbane.

PROFESSIONAL INSURANCE

Sir,—When one considers that for the small sum of £3 10s. 0d.—a sum less than we pay to have our names kept on the Register—we can have a major source of worry and anxiety taken from us, one wonders why so few take advantage of the services offered by the National Veterinary Benevolent and Mutual Defence Society. I understand that there are only about 50 per cent. of practitioner-members in this splendid association.

Recently I had to consult them regarding a case of swine fever, when I was presented with an account for £826 8s. 10d. by a client. What had happened to me could happen to anyone in practice. There is also a case pending with a well-known drug firm who supplied a husk injection which resulted in two heifers having to be slaughtered.

Because the cost of stock is so high and the farmers are supported by their union, it is absolutely essential that members of our profession should be ready and prepared for such emergencies. No better New Year resolution could be made than for all of us to join this splendid society, whose subscription is so small, and whose benefits are so great.

Yours faithfully,

G. C. LANCASTER.

Eastwick House,
Evesham, Worcester.

January 1st, 1955.

STUDIES ON PIGLET MORTALITY

Sir,—Because Field & Gibson (1955) again draw attention to the high mortality in baby pigs, their findings offer much food for thought. It would appear to me that as far as causes of mortality have been investigated in this, and in a previous paper (Field, Buntain, & Done, 1954), the position of piglet mortality will soon be brought into line with that of Six Days' Disease of chicks, which was shown to be an invasion by faecal organisms, *Cl. welchii* types predominating (Mann, 1945). There is, of course, little difference between the digestive system of the pig and the fowl, for neither can withstand a diet of high fibre content, nor can these animals deal successfully with diets rich in animal protein bearing substances, such as fish and meat meals.

There are two points I would raise. One, the case of the two farms in Hertfordshire (Field & Gibson, 1955) where the piglets were dying within 72 hours of birth of apparent baby pig disease although " there were certain factors which were not in keeping with baby pig disease." In this connection I have already referred to similar findings during the discussion on the paper on the Adrenal Gland read at the Torquay Congress (McGirr, 1954), in which I stated that I had occasionally found normal blood sugar levels in apparent baby pig disease. It would be interesting to know the blood sugar levels of the affected pigs in the Hertfordshire investigations.

Two. In the discussion of their paper, Field & Gibson take an attitude which I can only describe as wishful thinking, when they state that the isola-

tion of *Cl. welchii* from the faeces and skin of the sow gives a *clear* indication of the probable source of infection. (The emphasis is mine.) They state further, " It is reasonable to suppose that the sows ingest the organisms from the soil during the time they are at pasture when pregnant and that as a result they become carriers."

It is a well-known fact that the sow which the farmer allows to run wild during gestation and which has virtually to scratch for a living in copse, scrub or pasture, invariably returns with a family in the pink of condition, whereas those which are brought to pig in an atmosphere of scientific feeding, scientific housing, and scientific " steaming-up " prior to the birth of the pigs, manage to produce the 20 per cent. mortality which gives us all food for such disquiet.

Is it not just possible that our dependence on bran, fish meal, and other by-products from the scrapings of the bottom of the barrels of other industries, engender a *welchii, enterococcal,* etc. type of bacterial flora in the gut of the sow (and to which she herself has become immune) but which when smeared over skin and teats and offered to the piglet with its first few feeds, is just rather more than the piglet can withstand?

It is to be hoped that in due course the veterinarian will catch up with the nutritionist, who knows that if the farmer wishes to keep out of these troubles, he will have to put first things first, and refrain from feeding foods which, in effect, feed bacteria, which the infant cannot become acclimatised to however much drugs, vaccines or sera are offered as concomitants with the diet.

Yours faithfully,

T. BARTON MANN,

" Braust," Weyhill,
Nr. Andover, Hants.

January 7th, 1955.

References

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MCGIRR, J. L. (1954). *Ibid.* **66.** 850.
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ELECTROCUTION OF DOGS

Sir,—Mr. Moss has not quite understood the policy which UFAW has pursued for the past 25 years in relation to electrolethalling and electrocution; a policy which recent researches have shown to be right in respect of both these practices. What we asked was that adequate knowledge should be obtained by research before the adoption of either, and it now turns out that both are inhumane unless they are carried out in conformity with such knowledge.

The moral is that it is not always enough for animal-protectionists to ask a busy scientist a question to which he has to answer " yes " or " no " as best he can in the light of existing knowledge. Often scientific study is needed in order to ask the right question, and a final answer may be unobtainable without laboratory research.

UFAW tries to help in the handling of scientific problems of this sort and I am glad to say that several British and foreign animal-welfare societies, as well as veterinarians, have been generous enough to recognise and welcome the part which it can play, with happy results in the present connection.

C. W. HUME,
Director of UFAW.

7a, Lamb's Conduit Passage,
London, W.C.1.

January 6th, 1955.

EQUINE RADIOGRAPHY

Sir,—We were very sorry to see the letter which Mr. Berwyn Jones wrote to you on the subject of our article in THE VETERINARY RECORD.

It is hardly necessary to assure you that we have not plagiarised the labours of Mr. Jones and that we are in no way indebted to his researches.

Since we believe that his work was conducted on sections of dead animals his observations may perhaps have some relevance to the study of the radiological anatomy of the horse but have no application to the development of the radiography of the living—a subject with which our paper was exclusively concerned.

Yours faithfully,

K. M. DYCE,
F. S. DRURY,
R. H. A. MERLEN,

Royal Veterinary College,
London, N.W.1.

October 30th, 1954.

FRACTURES IN LARGE ANIMALS

Sir,—The repair of fractures of the lower leg in large animals, particularly the bovine, is becoming a fairly frequent procedure. It is a common practice to use casts made of plaster of paris slabs and bandages, often reinforced with metal strips or with a splint. Practitioners will have experienced the disappointing softening of such casts which occasionally takes place.

The writer has encountered several such cases and has treated them by means of plaster cases reinforced with a Dental Stone plaster*. This plaster is mixed with water and smeared liberally in layers over the completed plaster of paris cast. It dries speedily and produces a surface almost impervious to the effects of water and animal excretions. The support given is adequate in most cases, and the resulting cast is less unwieldy than a splint or steel reinforced cast.

Yours faithfully,

RICHARD H. C. PENNY.

Leighton Buzzard, Beds.

January 1st, 1955.

*Kaffir " D " Stone Plaster can be obtained from Earle Ltd., Wilmington, Hull.